

High Density Polyethylene Pipe

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Presentation by

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Project Objective

- The objective of this research is to determine if HDPE has the structural capacity and durability to perform as an alternative to corrugated steel pipe (CSP) and reinforced concrete pipe (RCP) for culvert applications.

Pipe Locations

- In the Dickinson District
- On highway 12 near Hettinger
- Constructed in the Summer of 2007

HDPE Installations

- 4 - 18" Approach Pipes
- 2 - 24" CL Pipes
- 2 - 30" CL Pipes



Construction History

- The 18" AP were not installed in 2007 according to backfill detail D-714-14.
- The 18" AP at RP 68.285 was reinstalled in 2008 according to backfill detail due to excess deflection.
- One pipe section was reinstalled on a 30" CL pipe at RP 71.465 due to excess deflection in 2007.

Mandrel Testing

- The HDPE pipes were tested for construction acceptance on 10/20/07 and for evaluation reasons on 7/23/08, 08/31/09, 09/29/10, and 10/05/11. This test was conducted to determine if the pipe was deflecting 5% or greater at any point within each pipeline

Mandrel Testing



Mandrel Testing October 5, 2011

Pipe Diameter	Mandrel Diameter (5% less than Pipe D)	Mandrel Diameter (7.5% less than Pipe D)
18"	17.1"	16.65"
24"	22.8"	22.2"
30"	28.5"	27.75"

Table 3: Pipe Diameters along with the mandrel diameter used to test for deflection.

- 4 - 18" approach pipes
 - 1 pipe has a deflection $\leq 5\%$
 - 3 pipes have a deflection $\geq 5\%$ and $\leq 7.5\%$
- The pipe with a deflection $\leq 5\%$ is the pipe that was reinstalled with granular backfill.

Mandrel Testing October 5, 2011

Pipe Diameter	Mandrel Diameter (5% less than Pipe D)	Mandrel Diameter (7.5% less than Pipe D)
18"	17.1"	16.65"
24"	22.8"	22.2"
30"	28.5"	27.75"

Table 3: Pipe Diameters along with the mandrel diameter used to test for deflection.

- 2 – 24" Centerline pipes
 - Both pipe's deflection is $\leq 5\%$

Mandrel Testing October 5, 2011

Pipe Diameter	Mandrel Diameter (5% less than Pipe D)	Mandrel Diameter (7.5% less than Pipe D)
18"	17.1"	16.65"
24"	22.8"	22.2"
30"	28.5"	27.75"

Table 3: Pipe Diameters along with the mandrel diameter used to test for deflection.

- 2 – 30" Centerline pipes
 - One pipe has a deflection $\leq 5\%$
 - One pipe has a deflection $\geq 5\%$ and $\leq 7.5\%$
- The pipe section deflecting $\geq 5\%$ is the section that was reinstalled during construction

Summary

- Installation is critical to performance.
- Granular backfill should be used on all installations.
- Avoid using heavy construction equipment on embankment if there is not adequate cover.
- Next year is the 5th year and final year of evaluation of these pipes.

The End

- Questions?



03/19/2009